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(56) Documents Cited

EP 0990820 A2

DE 004212243 A1

(58) Field of Search

UK CL (Edition T) F2D, F2Q

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Other: ONLINE: WPI; EPDOC; JAPIO.

(54) Abstract Title

**Gearbox cooling system**

(57) A gearbox cooling system comprises a continuous undulating passageway 17 formed by casting within a wall 15, eg floor 14, of a gearbox housing 13. The passageway 17 has inlet and outlet pipes 18, 19 which are connected into a vehicle engine cooling system so that liquid engine coolant will pass through housing floor 14 to remove heat from the gearbox, and cool lubricant in contact with the floor 14. Undulating passageway 17 comprises at least six spaced apart straight lengths each length being connected to an adjacent length by U-bends (22, fig 4). The housing 13 is formed from an aluminium based casting and the floor 14 may be separate casting removable secured to the housing 13. gearbox housing 13 may be attached to a clutch bell housing 12 so as to form a motor vehicle transmission housing 11. Inlet and outlet pipes 18, 19 are mounted to one side of the gearbox housing 13.

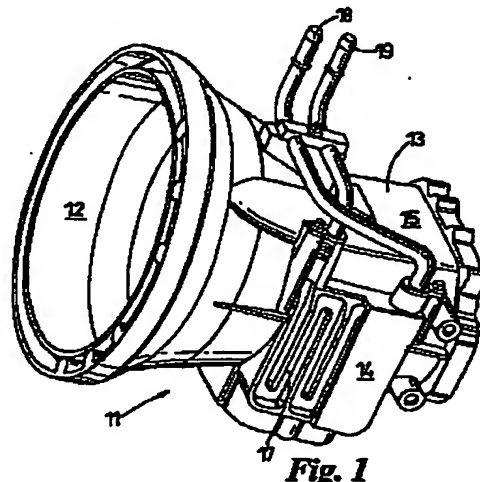
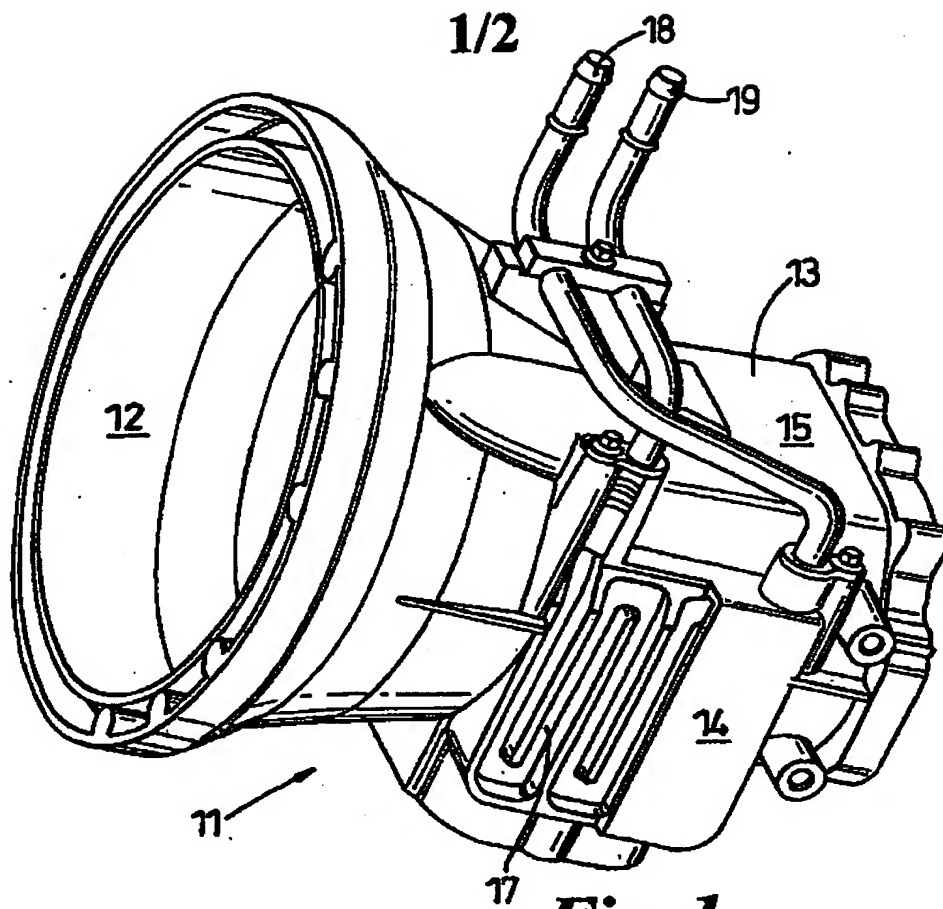
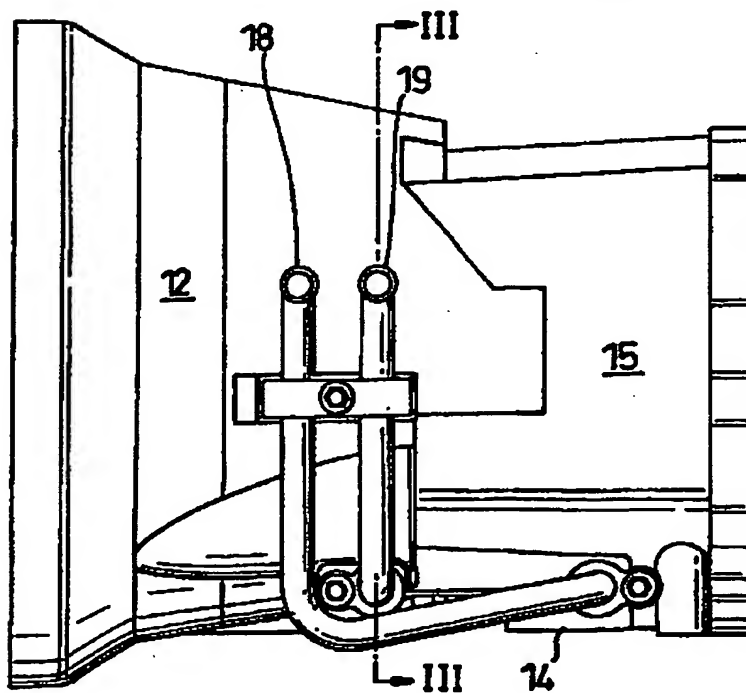


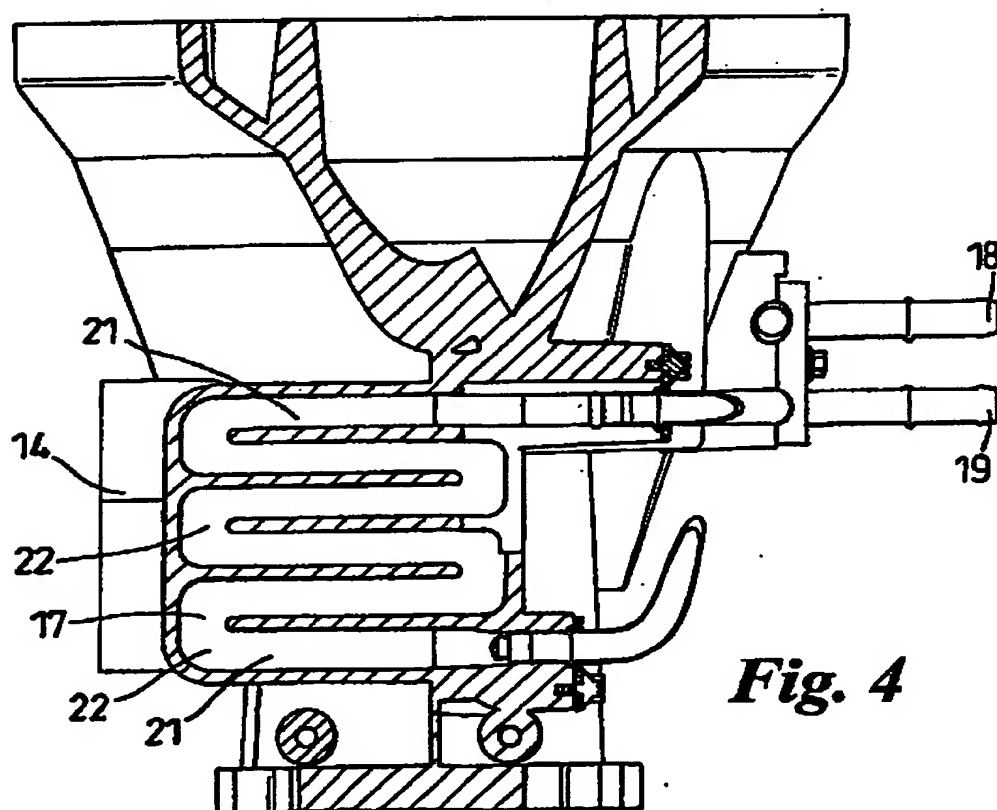
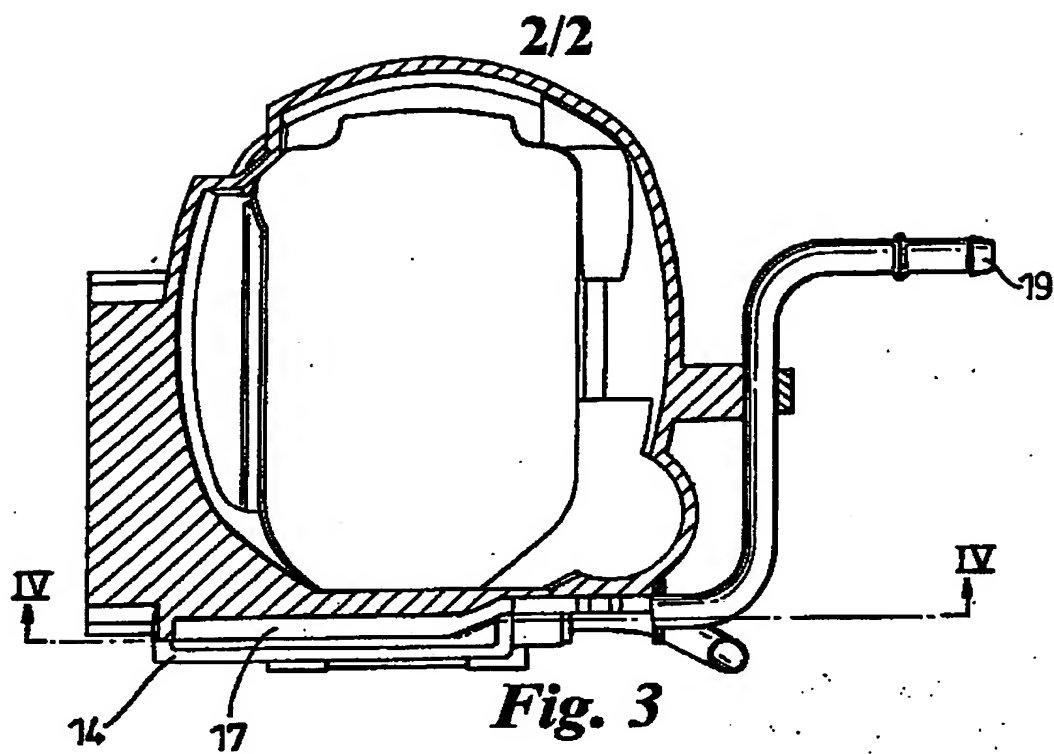
Fig. 1



**Fig. 1**



**Fig. 2**



A Vehicle Transmission CoolerField

This invention relates to a transmission having a  
5 transmission oil cooler.

Background of the Invention

Automotive transmission coolers are normally air blast and  
heat exchanger types which require an oil pump to push oil  
10 through an oil cooler with the vehicle in motion.

In applications where the vehicle is stationary and the  
transmission is used to drive auxiliary equipment there is  
little or no air flow through the oil cooler.

15

A motor vehicle gearbox having lubricant cooling is  
disclosed in DE-C-3904 654. The gearbox is provided with  
an oil cooler in the form of a undulating pipe through  
which cooling water flows. This pipe is arranged within the  
20 gearbox housing close to the floor of the housing. Such a  
system has obvious disadvantages in that the cooling pipe  
might come into contact with the moving transmission parts.

The present invention provides for a gearbox having an  
25 improved lubricant cooling.

Statements of Invention

According to the present invention there is provided a gear box housing wherein a lower portion of the gear box housing wall, preferably the floor, has at least a portion thereof  
5 with, a continuous undulating passageway formed within the wall through which coolant can flow.

Gearbox housings are typically formed from aluminium based castings and the passageways may be cast into the wall of  
10 the housing forming the floor.

The ends of the passageway in the wall are connected to inlet and outlet pipes secured to one external side of the housing.

15

The undulating passageway comprises at least six spaced apart straight lengths, each length being connected to an adjacent length by "u" bends.

20 The portion of gearbox housing wall forming the floor comprises a detachable wall portion removably secured to the housing.

The gearbox housing may form part of a transmission housing  
25 including a clutch bell housing.

The invention also relates to a motor vehicle gear box including a gearbox housing according to the present

invention, and having lubricant cooled by the flow of coolant through said passageway.

A further aspect of the invention provides a motor vehicle  
5 having an internal combustion engine with a liquid filled cooling system, wherein the engine cooling system is connected to the passageway in the gear box housing of a gearbox according to the present invention.

10 The water based coolant used for cooling the engine system removes heat from the transmission whilst the vehicle is stationary and the need for a separate air blast cooler and oil pump is removed.

15 A further advantage is that in conditions of extreme cold, the transmission oil is brought quickly upto working temperature reducing parasitic losses.

Another aspect of the invention provides a method of  
20 cooling the lubricant in a motor vehicle gearbox in which that portion of the gear box housing wall forming the floor of the housing has at least a portion thereof provided with a continuous undulating passageway formed within the wall, and passing coolant through the passageway to cool  
25 lubricant in contact with the floor of the gearbox.

#### Description of the Drawings

The invention will be described by way of example and with

reference to the accompanying drawings in which :

- Fig.1 is an isometric view of a transmission housing including a gear housing according to the present invention with the floor shown in partial section,
- Fig.2 is a side elevation of one side of the housing shown in Fig. 1,
- Fig.3 is a section on the line III-III of Fig.2, and
- Fig.4 is a section on the line IV-IV of Fig.3.

#### Detailed Description of the Invention

With reference to Figs. 1 to 4 of the accompanying drawings, there is shown a transmission housing 11 comprising a clutch bell housing 12 and gearbox housing 13. The bell housing and gearbox housing are typically formed from castings which are assembled together by the use of fastenings e.g. nuts, bolts, studs etc.. The castings may be formed from aluminium or aluminium alloys.

20

The gearbox housing 13 has a floor 14 which may be cast integrally with the gear box housing wall 15, or may be a separate cast panel which fastens to the housing 13. The floor 14 is provided with an internal undulating passageway 17 which is preferably cast into the floor but could be machined into the wall of the floor. The passageway 17 comprises a plurality of substantially parallel straight sections 21, typically at least six, with adjacent sections

linked by "U" bends 22. The undulating passageway in the floor forming a heat exchanger for cooling gearbox lubricant.

- 5 Inlet and outlet pipes 18 & 19 are connected into the end of the passageway 17 for the circulation of coolant through the passageway. The pipes 18 & 19 are mounted to one side of the gearbox housing.
- 10 In use, a motor vehicle having a liquid cooled engine and a transmission with a gearbox housing 13 comprising the cooling passageway 17, will have the passageway 17 connected into the vehicle engine cooling system via the pipes 18 & 19. The liquid engine coolant will pass through
- 15 the housing floor 14 to remove heat from the transmission system via the lubricant in contact with the floor.



Claims

1. A gear box housing with a floor and wherein a portion of the gear box housing wall in a lower portion thereof is  
5 provided with a continuous undulating passageway formed within the wall through which coolant can flow.
2. A gearbox as claimed in Claim 1, wherein the lower  
10 portion of the gearbox housing comprises at least a portion of the gear box floor.
3. A gearbox housing as claimed in Claim 1 or Claim 2 wherein the housing is formed from an aluminium based casting or castings and the passageways may be cast into  
15 the housing wall.
4. A gearbox housing as claimed in any one of Claims 1 to 4 wherein the ends of the passageway in the wall are connected to inlet and outlet pipes secured to one external  
20 side of the housing.
5. A gear box housing as claimed in any one of Claims 1 to 4, wherein the undulating passageway comprises at least six spaced apart straight lengths, each length being connected  
25 to an adjacent length by "u" bends.
6. A gearbox housing as claimed in any one of Claims 1 to 5, wherein the portion of gearbox housing wall forming the

floor comprises a detachable wall portion removably secured to the housing.

7. A motor vehicle transmission housing including a clutch  
5 bell housing and a gearbox housing as claimed in any one of Claims 1 to 6.

8. A motor vehicle gear box including a gearbox housing according to Claims 1 to 6, and a transmission housing  
10 according to Claim 7, and having lubricant cooled by the flow of coolant through said passageway.

9. A motor vehicle having an internal combustion engine, an engine cooling system circulating cooling liquid through  
15 the engine, and a gearbox as claimed in Claim 7, wherein the engine cooling system is connected with said passageway in the wall of the gearbox housing.

10. A method of cooling the lubricant in a motor vehicle  
20 gearbox in which that portion of the gear box housing wall forming the floor of the housing has at least a portion thereof provided with a continuous undulating passageway formed within the wall, and passing coolant through the passageway to cool lubricant in contact with the floor of  
25 the gearbox.

11. A method as claimed in claim 9 wherein the coolant also passes through the vehicle engine cooling system.



INVESTOR IN PEOPLE

Application No: GB 0207810.3  
Claims searched: 1 to 11

Examiner: Mike McKinney  
Date of search: 8 August 2002

## Patents Act 1977 Search Report under Section 17

### Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.T): F2D; F2Q.

Int Cl (Ed.7): F16H 57/04

Other: ONLINE: WPI; EPODOC; JAPIO.

### Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	EP 0990820 A2 (DAIMLER CHRYSLER) see whole specification, especially figs 1 to 5d.	1 to 11.
X	DE 4212243 A1 (VOLKSWAGENWERK) see figs 1 and 2, and also WPI Abstract Accession No 92-367227/45.	1, 4 and 6 to 11.

X Document indicating lack of novelty or inventive step  
Y Document indicating lack of inventive step if combined with one or more other documents of same category.

& Member of the same patent family

A Document indicating technological background and/or state of the art.  
P Document published on or after the declared priority date but before the filing date of this invention.  
E Patent document published on or after, but with priority date earlier than, the filing date of this application.